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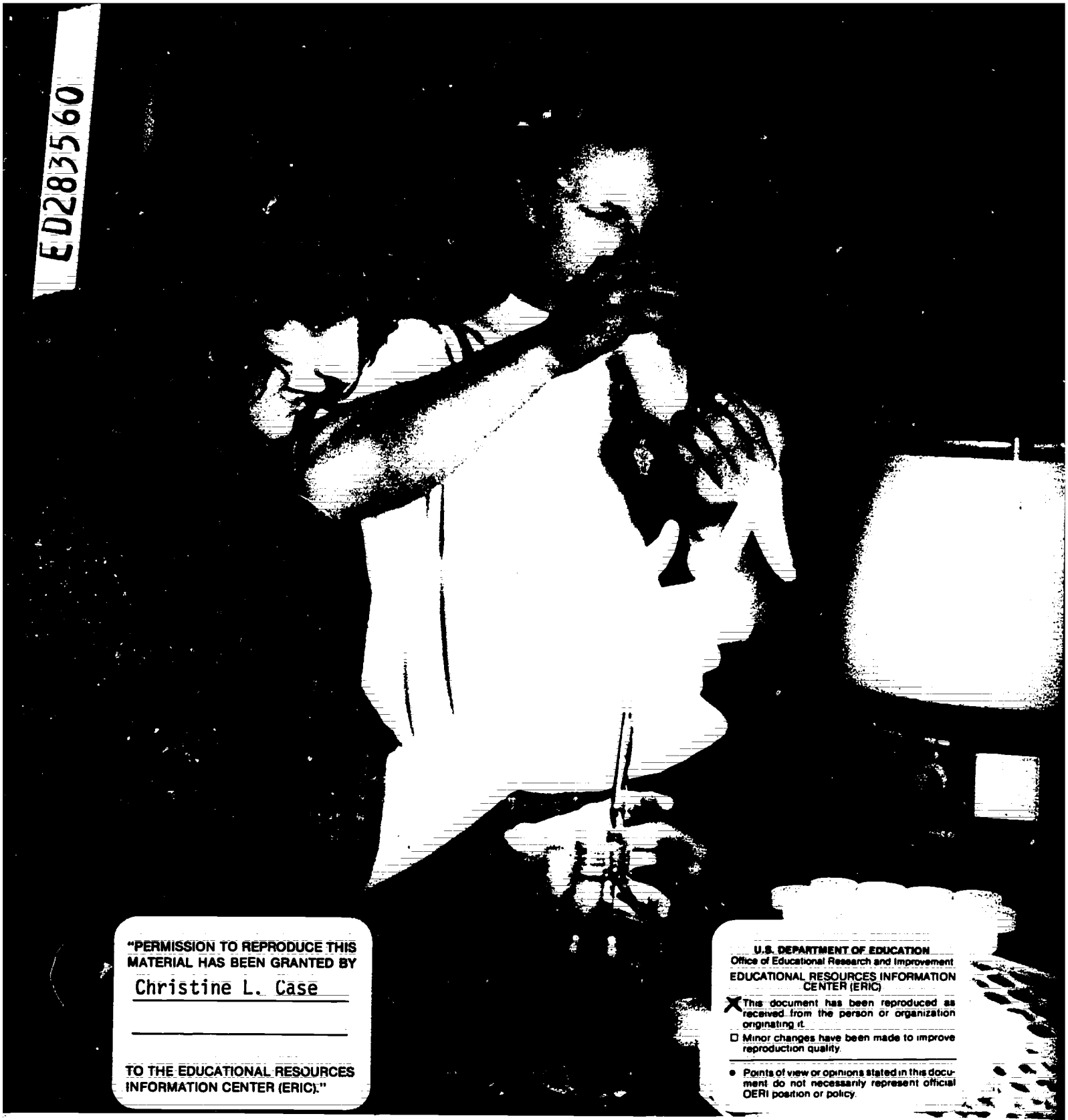
ABSTRACT

A study was conducted at Skyline College (California) to assess the quality of the college's transfer-science program and to gather information from former students who had completed at least 40 units and had received their lower division science training at Skyline. Questionnaires were sent to 540 former Skyline students who had enrolled in Chemistry 220 or Physics 240 between fall 1969 and spring 1986. Study findings, based on a 23% response rate, included the following: (1) background data obtained from college records indicated that the average science student was a male, 21 years of age, who completed 72 units at Skyline within 3 years and earned a grade point average (GPA) of 3.03; (2) students completed between 2 and 16 of the classes recommended for science majors; (3) 50% of the respondents were attending school at the time of the survey, and 63% were employed; (4) respondents felt that the commitment of the faculty to students was a major strength of science and mathematics instruction at Skyline; (5) Skyline was rated higher than students' transfer institutions in terms of faculty accessibility, academic advising, help with personal problems, quality of instruction, and overall institutional rating, but lower in terms of faculty professionalism, quantity of instruction, and amount of homework; and (6) 93% of the respondents transferred to a four-year college, with 69% of the transfers estimating that their GPA after transferring was 3.0 or higher. The survey instrument is appended. (EJV)



Skyline College

Transfer Science Students: A 17-year Follow-up Study

Transfer Science Students:
A 17-Year Follow-up Study
Fall 1969 through Spring 1985

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Preface. Andrea Alfaro provided invaluable assistance accumulating and sorting data. Andrea is a Skyline science student who will transfer to the University of California at Davis in Fall 1987. She is not unlike the students about whom this report was written and to whom our work is dedicated.

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Excerpts from respondents' "Additional comments" are shown in shaded areas.

Introduction

San Mateo County Community College District has made a commitment to

> *provide lower-division transfer programs which prepare students for continued education in four-year colleges and universities.*[1]

In January 1986 this commitment was reaffirmed with the directives that

> *The District should continue to evaluate transfer programs* and *The District should continue to give a high priority to articulation with transfer ... institutions.*[2]

As part of the District effort to achieve these goals, the Science-Mathematics-Technology Division (SMT) offers courses for students transferring to four-year institutions. These classes are part the educational programs required of science majors. In addition to providing an environment in which students can learn content, through these classes, SMT faculty strive to

- assist students in achieving their individual educational goals
- prepare students for transfer to a four-year institution, and
- help students in career planning and development.

SMT faculty work closely with students in classrooms, laboratories, and out of class. Some of this time is devoted to content-area tutoring and some, to creating an awareness in students about their futures. Shymansky (1978) points out that the many facets of science from abstract vocabulary and concepts to concrete experiments and physical descriptions provide the opportunity for science teachers to tailor instruction to students' individual needs. SMT faculty provide a variety of environments to encourage students to develop their potential. Study groups and open labs are two examples of the extra time spent with students.

While course transferability is coordinated in articulation agreements between Skyline College and senior institutions, feedback from former students who have transferred to senior institutions can make it possible to determine whether we are meeting not only the standards of the senior institutions but the expectations of the students and ourselves as well. Astin (1971) describes this as a way to determine "absolute" standards of performance.

The importance of the first two years of college must not be underestimated,

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[1]SMCCCD. Board Report 84-1-10B, approved 4-11-84. District Missions and Goals statement.

[2]SMCCCD. Board Report 85-12-2B, approved 1-15-86. District Missions and Goals directives.

students are not simply exploring or biding their time. For example, a follow-up of community college social science majors showed that more than 90 percent were working in social science fields after earning their baccalaureate degrees (Rockland, 1978). It is during the first two-years of college that students are making career-decisions and program choices that will affect the rest of their lives. SMT faculty are deeply concerned with the success of our students. These students are the researchers, science educators, and doctors for the future - science professionals who will have an impact on mankind. Our primary concern is to provide quality instruction, for if we fail in preparing a student for upper division work, then the student fails. This study was undertaken to monitor our success at preparing our students for transfer.

While senior institutions' school relations offices provide data on transfer, this study differs from those reports in many respects. The reports from senior institutions provide only lists of students' majors and GPAs. We wanted to ascertain whether students continued their science major after leaving Skyline. Additionally, we obtained feedback from students in their post-graduate careers, not just those currently enrolled at another institution. While questions on the students' GPAs both at Skyline and the transfer institution are part of this study, so are questions on such items as whether the student found the transfer process difficult, whether, if employed, their work relates to their academic training, and whether the quality of instruction at Skyline College differed from that of the four-year institution. That is, we asked students for their opinion about matters which affected them.

A review of literature and an ERIC search provided a paucity of information on the assessment of transfer programs. The transfer studies located were short-term, that is, they compared students performance at a community college with performance over the next one or two years at a four-year school, and the majority of the published studies were limited to transfers to a single university regardless of major. The scope of our study is broader in that we have attempted to determine academic and professional outcomes of science majors at senior institutions over a 17-year period.

The quality of education at Skyline is nothing short of outstanding. I would recommend Skyline to anyone who is interested in science and math ...

Purposes

The purposes of this project are

- To assess our ability to provide quality education and prepare our students to compete successfully at four-year schools.
- To obtain information for prospective transfer students to use in their decision- making.
- To contact successful alumni to provide a network of support for future students.
- To develop a data-base of Skyline College science students.
- To provide a model for follow-up studies in other transfer programs.

Assumptions

A questionnaire was to be sent to Skyline Transfer-Science majors. Because students' majors are not identified in their records, to identify our target population we made the following assumptions.

- A "Skyline student" is one who has completed at least 40 units at Skyline College.
- Possible transferees are students no longer enrolled at Skyline College.
- A "Skyline science major" is a student who received his/her lower division science training at Skyline College.
- The definition of "training" is based on completion of Chemistry 220 or Physics 250. We expect that all life, physical, and earth science majors will take at least one of these classes if they follow the recommended minimum requirements for transfer.

[Although] I barely graduated from high school ... I graduated from Skyline with highest honors, with confidence, self-esteem, and a plan for the future. My success is entirely due to the faculty of Skyline, for which I am forever grateful.

Limitations

This study had the following limitations.

- In many cases we had out-of-date addresses used by students when they last attended Skyline College. Young community college students are likely to move soon after completing their sophomore year to attend senior institutions or to begin careers. We did not trace students who had moved.
- We did not send "reminder" mailings or obtain telephone responses.

I owe [Skyline] College a great deal for making me realize my goals and potential. Thanks for making this possible.

Skyline is the best educational deal going - possibly anywhere in the world.

Procedures

Student names were obtained from Chemistry 220 and Physics 250 roll sheets from Fall 1969 through Spring 1986. Roll sheets prior to 1981 are available from the College Registrar and after 1981, from EIS[3].

Microfiche and paper records stored in the Registrar's office were used to get background information on students who attended Skyline College prior to 1981. EIS could not generate a data-base, consequently, records for each student who attended from 1981 through Fall 1986 were researched by hand. A data file (Appendix B) was established on each student who met our criteria (as described in Assumptions).

SMT faculty reviewed lists of students appropriately divided into disciplines (students who had taken Biology 215 and higher, Geology 210, etc.) to provide current address information and to determine whether students had been omitted.

A questionnaire was sent to 540 former Skyline students. The questionnaire (Appendix A) was reviewed by SMT faculty. Each questionnaire was identified with a code number so responses could be added to students' data files.

To maximize responses a personalized note was written on the cover letter and a self-addressed-stamped-envelope was included for the student's reply. The mailing was timed to coincide with quarter breaks and spring recesses to facilitate timely responses from students currently attending four-year schools and not living at home. Moreover, research shows spring surveys get a higher response rate than fall surveys (Kirby, 1978). We allowed four weeks for responses.

[3]San Mateo County Community College District's Educational Information System.

Questions

We received a 23-percent response rate, and before analyzing the data, three questions were addressed.

1) Is a 23-percent response rate "reasonable"? That is, is this return rate similar to other such surveys?

The State Chancellor's Office (SAM, 1978) has established that a 15 to 30 percent response rate is to be expected from a single mailing. Walleri (1981) received a 14 percent response to a three-year follow-up study, while Nespoli (1984) reports a 12 percent response rate to a one-year study, and Roberts (1986) reports 17 percent to a one-semester follow-up. As our study surveyed students who left Skyline as long ago as 17 years, we believe that the 23-percent return rate is reasonable.

2) Is a 23-percent response rate "acceptable"? That is, does the number of responses allow statistically meaningful analyses of data?

The validity of statistical analyses depends on the absolute number of respondents, not on the percentage of respondents. One hundred responses is more than sufficient for statistical comparisons. Quinley (1983) indicates that nonrespondent bias is unlikely if the population has a common identity and if the survey did not ask personal questions. Our population has a common identity, that is, completion of at least 40 units and two or more science majors' courses at Skyline College. For the most part, our questionnaire did not ask sensitive questions.

3) If the return rate is "unacceptable", could it have been increased in a justifiably practical and inexpensive fashion?

Naturally, many addresses in EIS and the Registrar's Office are long out of date. While we attempted to obtain recent addresses from both faculty and students, we neither sent reminder notices nor tried to contact nonrespondents by phone. Statistical errors generally decrease as the inverse of the square root of the number analyzed. That is, if we had increased our response rate by half, we would have decreased the statistical error from 9.1 percent to 7.4 percent. The small increase in precision that might be gained does not justify the time and money required to increase the sample.

My days at Skyline were truly some of the best of my life, mainly due to the science/math departments. I had some very good and caring instructors to whom I will forever be indebted. Thank you.

Results and Discussion

123 (23%) former students responded to our questionnaire[4]. Students have been grouped (see figure 1) according to the year they first enrolled in Skyline, each group includes eight semesters.

Group 1	Fall 1969 - Spring 1973
Group 2	Fall 1973 - Spring 1977
Group 3	Fall 1977 - Spring 1981
Group 4	Fall 1981 - Spring 1985

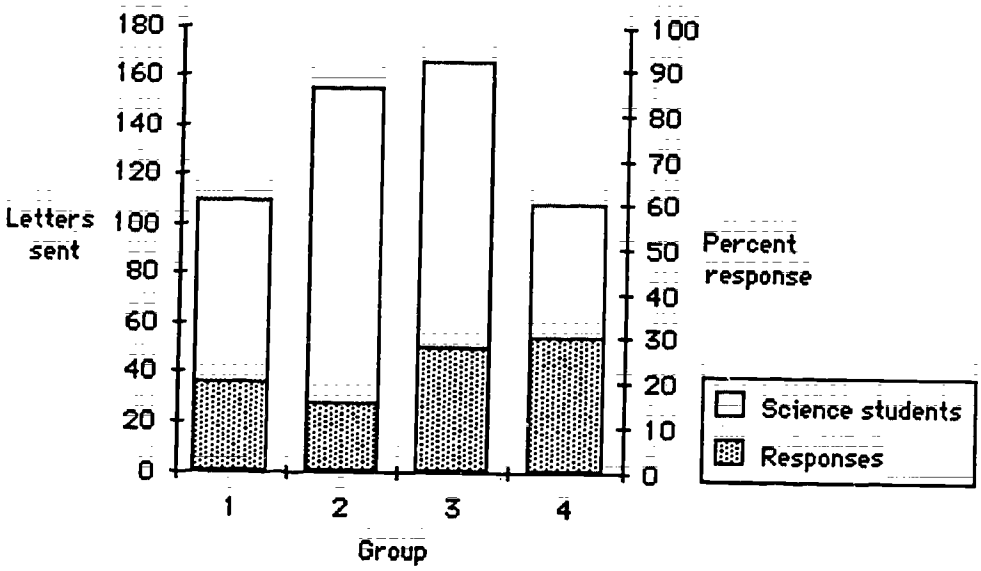

Figure 1. Science majors were divided into groups based on the year they first enrolled in Skyline College. Each group consists of eight semesters.

[4]We did not get any mail returned by the post office. One former student had no address. One former student is deceased.

Responses were fairly evenly distributed over the 17-year period covered by this study. The GPA distribution of the respondents is not the same as that of our defined population, the respondent group has a somewhat higher GPA. In order to determine whether this bias will result in a bias in the conclusions drawn from our survey, we performed an analysis of variance on responses to "Overall Rating of Skyline College"[5] as a function of GPA. No significant difference between respondents with high GPAs and those with low GPAs was found. Therefore, while the sample distribution is biased toward those with high GPAs, the responses to the questions are unbiased.

The population

Background data obtained from college records on science majors are listed in Table 1. From this information, a profile of the *average* science student is: a male, 21 years old, who completes 72 units at Skyline College in 3 years with a GPA of 3.03. The percentage of female science students has increased slightly each year but remains below female representation in the College. (See figure 2.) We attempted to get comparable data for the entire college and found that GPAs for selected years indicate that the average GPA at Skyline College is

Table 1. Summary of science majors enrolled between Fall 1969 and Spring 1985.

	Males	Females	**Total**
Number of students	316	224	**540**
Average age entering Skyline	20.5	20.8	**20.6**
Average number of units at Skyline	68.8	76.3	**71.9**
Average Skyline GPA	2.97	3.12	**3.03**
Average number of years at Skyline	2.8	3.4	**3.1**

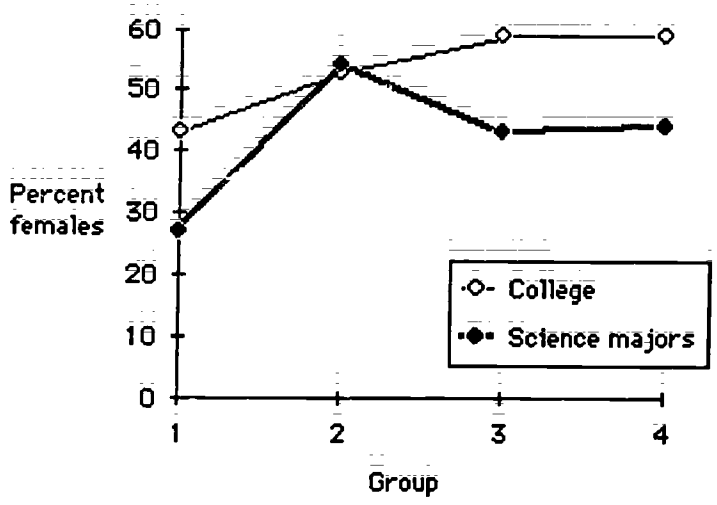

Figure 2. The percent of females majoring in science at Skyline College compared with the percent of total female enrollment.

[5]This is the last part of question 13 on the survey questionnaire.

approximately 2.8[6].

A list of courses recommended for majors is in Appendix C. Each student completed between 2 and 16 classes from this list; the average number of classes is 6 (the mode is 5 and the median, 3).

These students came to Skyline for the same reasons as other students[7], that is, Skyline is convenient (72%) and inexpensive (66%). While attending Skyline the respondents, like most Skyline students[7], worked full- (11%) or part-time (68%). Twenty percent took at least one science or math class in the evening.

What are they doing now?

Figure 3 shows that 50 percent of the respondents are currently in school and 63 percent are employed. Eighteen (23%) of the employed respondents are also in school: 7 are undergraduates, 10 are in graduate school, and 1 is in professional school.

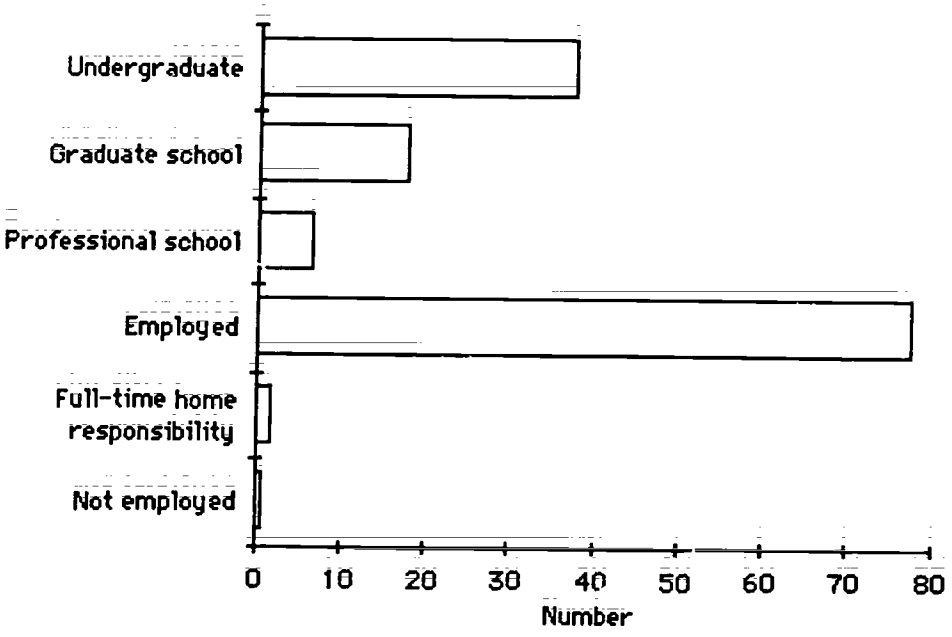

Figure 3. Present major activities of respondents. One respondent indicated "not employed" having recently left a managerial position to look for a job that required her training in biology.

[6]EIS. Enrollment analysis. F 1983, F 1984, F 1985, and Sp 1987.

[7]R. Butler. Enrollment Data Reports. Spring 1972-Fall 1978. San Bruno, CA: Skyline College, Office of Admissions.

As might be expected, the majority of the respondents currently in school are from Group 4, the students who left Skyline most recently (see figure 4).

Ninety-five percent of the respondents are living in California and 66 percent are in San Mateo County.

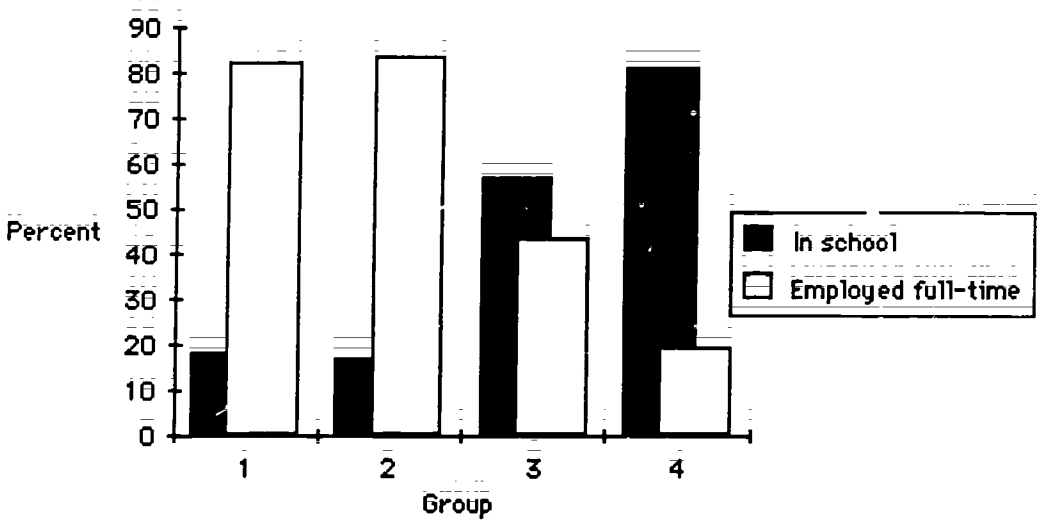

Figure 4. Comparison of respondents' present major activity with first year of enrollment at Skyline College.

Their perceptions of Skyline College

Figure 5 shows that these students generally feel very good about the instruction they received at Skyline. They were virtually unanimous (97%) in saying they would recommend Skyline College to a friend.

When asked what were the strong points of science and math instruction at Skyline College, students were virtually unanimous in the feeling that the commitment of the faculty to students is our strength. The following respondents' comments are representative of the many comments received.

The instructors were well organized. They know the material they want to cover and they cover it well. They make the courses challanging yet take personal time for anyone who needs extra help.

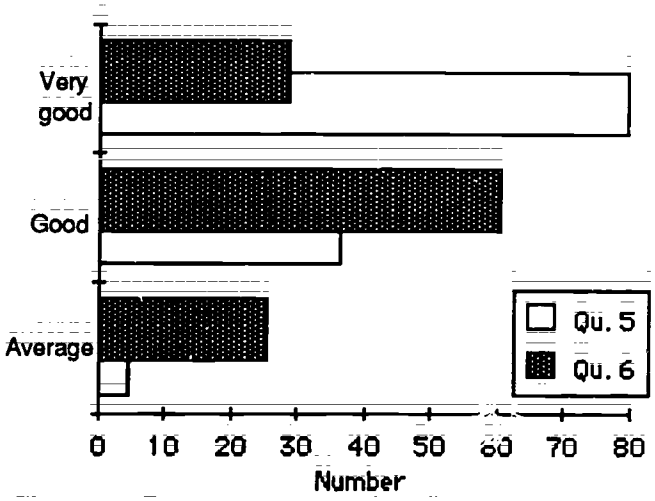

Figure 5. Responses to questions 5 and 6. Question 5: What is your overall evaluation of instruction received at Skyline College in science and math courses? Question 6: What is your overall evaluation of instruction received at Skyline College in all other courses?

When I started at Skyline, I was about to give up college and a career in science, but I was going to take just one more science class to see whether I should stay with it or not. The attitude of the school and close personal contact with the instructors inspired me to continue with my original goal.

Small class size was identified by many respondents as a major advantage of Skyline College. Small classes do not guarantee that an instructor will be enthusiastic or provide individualized instruction but they do afford the opportunity for instructors to pay attention to all students in class.

Laboratory classes were also identified as a strength because they provided training and experiences in modern, well-equipped facilities. One respondent said *I learned lab techniques at Skyline that were ... overlooked at [my transfer school].* And, another added *[the] time and personal attention in the laboratory at Skyline has prepared me well for a research-oriented school.*

These students were obviously pleased with Skyline College and perhaps reluctant to offer criticism when asked to describe the weak points of science and math instruction, many responded with comments like:

I feel myself unable to offer any helpful criticism - sorry. I was very well prepared in the science and math areas, and had little trouble adapting as a transfer student to the rigorous regime at [UC] Berkeley.

Some students identified a difficulty inherent in a small school. A student must plan carefully in order to complete all requirements in a timely manner. The areas cited most frequently as presenting difficulties were the three-semester sequences of calculus and physics.

I am thankful to Skyline's Science and Math Division for sparking my interest in Science and Math!

Below we have listed some important features of college life. We would like you to rate Skyline College's Science and Math Departments on each of them. Then we would like you to rate your transfer school (Question 13).

A summary of responses to question 13 which asked former students to rate selected features of college life at Skyline College's Science and Math Departments and at their transfer schools is listed in Table 2.

Table 2. Respondents' rating of Skyline College and their transfer schools.
N = 113. 1-Low; 2-Fairly low; 3-Average; 4-Above average; 5-High

	Skyline College	Transfer school
Faculty accessibility	4.4	3.1
Faculty professionalism	3.9	4.0
Academic advising	3.2	2.9
Help with personal problems	2.9	2.4
Quality of instruction	4.2	4.0
Quantity of instruction	3.8	3.9
Competition for grades	2.9	4.1
Amount of homework	3.4	3.9
Help with vocational planning	2.7	2.7
Making friends	3.7	3.3
Overall rating of school	4.1	3.9

Accessibility of faculty showed a large difference between the responses for Skyline and transfer schools. As shown in Figure 6, former students rated Skyline SMT faculty more accessible than the faculty at their transfer schools (4.48 ± 0.74 compared to 3.22 ±0.97). Analysis showed that

a) The accessibility of the SMT faculty was rated the same whether the student transferred to UC[8] or CSUC[9].

b) The accessibility of the UC and CSUC faculties was the same.

c) 95 percent of the respondents rated SMT faculty equally or more accessible than the transfer institution faculty.

d) A regression analysis showed no correlation between the accessibility rating given Skyline faculty and that given faculty at the transfer school; this indicated that the two questions were answered independently.

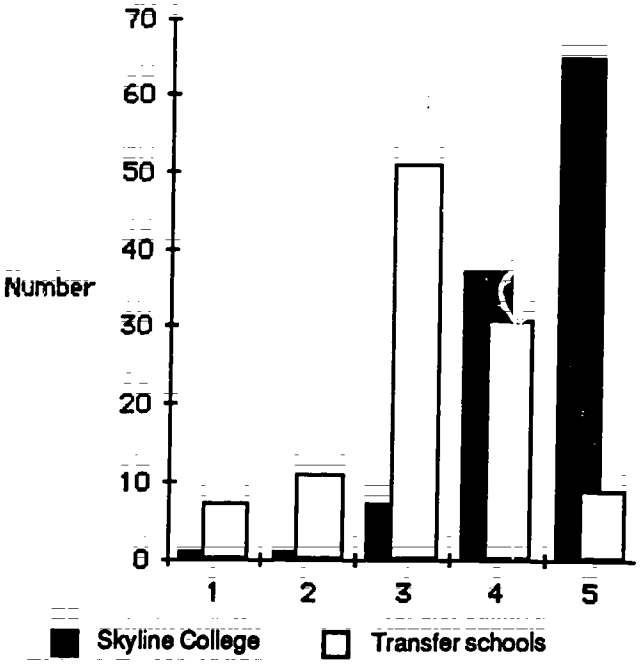

Figure 6. Respondents rated accessibility of faculty at Skyline College and at their transfer schools. 1 - Low; 2 - Fairly low; 3 - Average; 4 - Above average; 5 - High.

[8]University of California.

[9]California State Universities and Colleges.

The high rating for faculty accessibility is not simply due to faculty keeping their office hours but the overall quality of regular interaction with SMT faculty as described by respondents as a strength of science and math instruction. Respondents noted that field trips, open labs, and seminars provided special contact with faculty.

The single highest priority of SMT faculty is to provide **quality instruction.** Respondents gave SMT a high rating, higher than their transfer schools.

Competition for grades is greater at the transfer schools. As two respondents pointed out, this is because of the students themselves. The diverse student body at Skyline College includes some students who are making up academic deficiencies and who may not have set individual goals yet. Students at four-year schools are more homogeneous in that their goals are generally well-defined and earning high grades is important to achieving those goals.

Amount of homework and **quantity of instruction** are greater at the transfer schools. Respondents might have equated quantity of instruction with amount of homework since course content and hours are fairly uniform (as per articulation agreements). Students come to Skyline College with a wide variety of abilities and we place a high priority on nurturing existing skills and helping to develop new abilities. One respondent described our efforts: *Academically weak individuals can emerge as strong competitors at U.C.* And another said, *Skyline professors are sensitive to the student's level of comprehension and pace their classes accordingly.*

The average rating, albeit, higher than that of the transfer schools, for **academic advising** is a disappointment. As shown in Figure 7, this has improved in recent years. Respondents' comments indicated that better information on lower division course requirements to prepare for upper division work is highly desirable. Like most people, the respondents would like a blue-print for their future. When they seek such specific plans from college staff, we can only advise. The choice of college, major, and courses is a personal one and is affected by many nonacademic factors including personal obligations, preferences, and finances. While advising students in the future, we should clearly make students aware of their responsibility in selecting courses, majors and transfer schools.

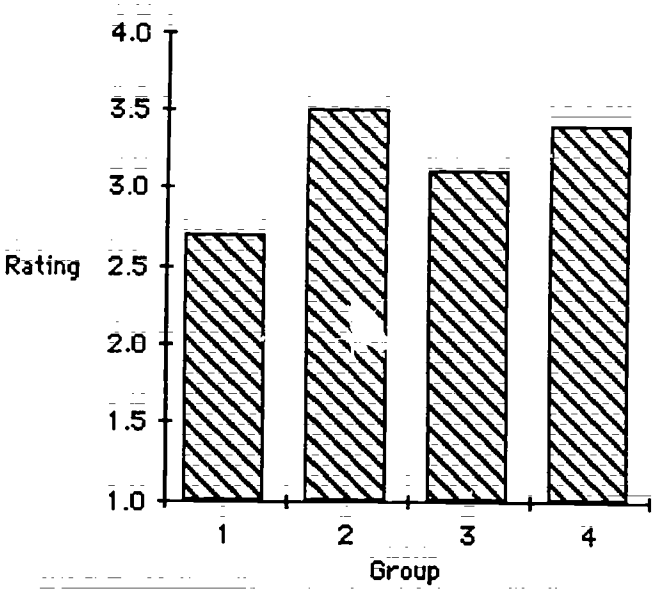

Figure 7. Rating of academic advising at Skyline College by group. 1 - Low; 2 - Fairly low; 3 - Average; 4 - Above average; 5 - High.

Students felt they received more help with **vocational planning** at Skyline than at their transfer schools. It is likely that this is due to regular interaction with the faculty out of class. Vocational planning is usually perceived separately from academic advising as the students talk to content-area instructors about career opportunities in that discipline. The slightly below average scores for assistance may be that while a student would like a clear-cut list of classes and what job will be waiting, faculty are aware that the decisions are primarily the student's responsibility. It is noteworthy that, while students are comparing their first two years of college (at Skyline) to their last two years (at the transfer school), they received more vocational guidance as freshmen and sophomores. Clearly, career decisions are being made at the community college level.

The transfer school faculty was rated slightly higher (4.0) than SMT faculty (3.9) for **faculty professionalism.** Frankly, we expected the transfer schools' faculties to be rated much

than SMT faculty because of the relationship between publications, research, and science. Skyline College faculty are professional *educators*, while faculty at senior institutions have a smaller teaching assignment and contractual obligations to advance scientific knowledge. One respondent noted that Skyline SMT ... *instructors have good credentials and are dedicated to science.*

In addition to evaluating the quality of instruction, we attempted to measure some of the other facets of college life: aesthetic, social, and personal. Students found **making friends** easier at Skyline than at their transfer schools. Students felt they received more help with **personal problems** at Skyline than at their transfer schools but both scores were fairly low. This question was not answered by all respondents (79% responded), and some wrote that they did not seek such help. When asking for personal help, an individual may set their expectations too high so that another individual cannot give them the solutions they are seeking.

The **overall rating** of Skyline College and the transfer school indicates that, considering everything, the students' rated Skyline College (4.1) higher than their transfer schools (3.9).

About transferring

115 respondents (93%) transferred to a four-year school from Skyline College[10]. As shown in Figure 8, an equal number transferred to the California State Universities and Colleges (CSUC) and University of California (UC) systems.

Thirty percent of the respondents transferred to San Francisco State University, 17 percent transferred to the University of California at Davis, and 15 percent, to the University of California at Berkeley. San Francisco and Berkeley could be considered "home" schools in that transfer does not necessarily involve moving. Many transfer to Davis because of the excellent reputation of its science programs and because there are always former Skyline students in residence there who will assist new transfer students during their transition.

> The basic education I received at Skyline left me better prepared for upper division courses ... than a majority of my [transfer school] classmates.

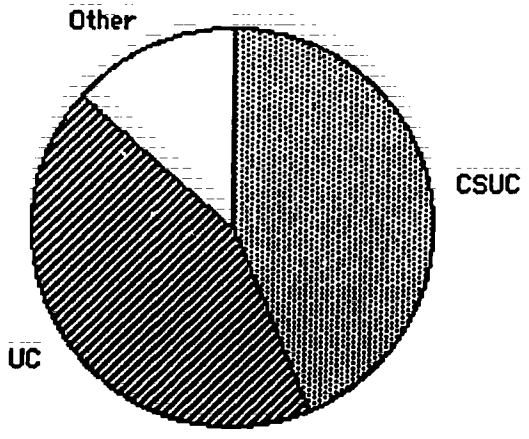

Figure 8. Transfer institutions of former Skyline students.

[10] A complete list of schools is in Appendix D.

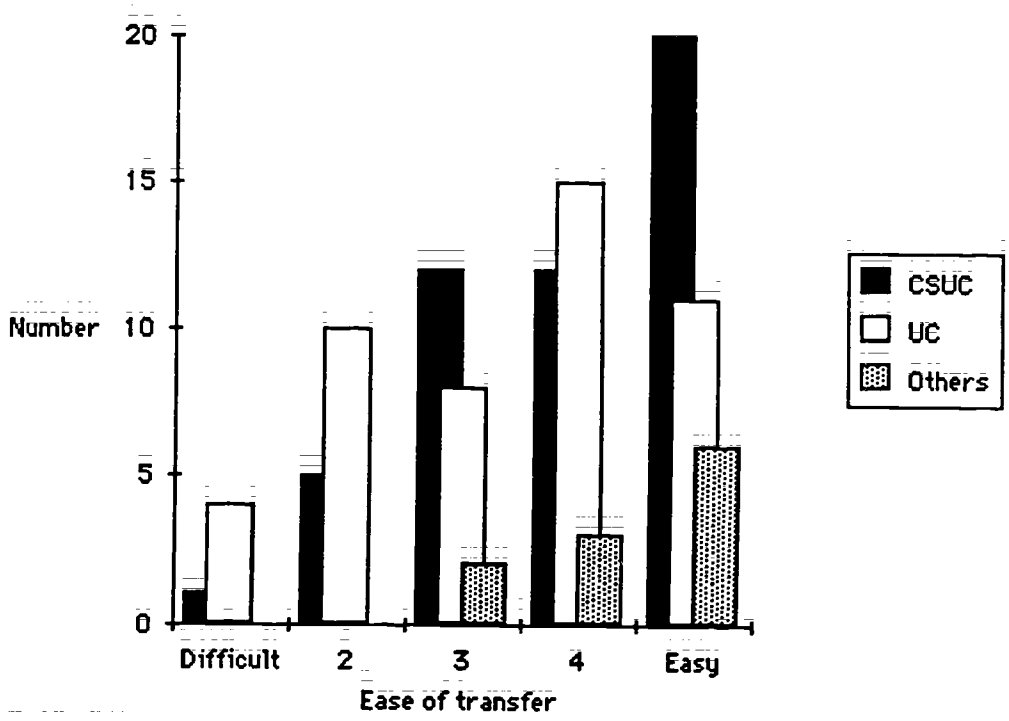

Figure 9. Students rated their transition to a four-year school on a scale of 1 (difficult) to 5 (easy).

Students were asked to rate their transition to their transfer school (Figure 9). Transition is not a neutral term and it is expected that a period of transition is accompanied by anxieties and uncertainties. Nevertheless, the majority of students found the transfer process fairly easy. There is no significant difference in the ease of transfer between those transferring to UC or those transferring to CSUC. It is interesting to note that all four of the respondents who indicated that their transitions were "quite difficult" transferred to the University of California at Berkeley. The average GPA of these students was 3.4, approximately the same as our respondent sample as a whole.

Results suggest that Skyline students were

Table 3. Summary of academic performance of science students.

	CSUC	UC	Other	Total
Number	49	49	17	115
Ave. Skyline GPA	3.1	3.3	3.0	3.2
No. reporting GPA >3.0 at transfer school	32	33	9	74
Number				
Graduated	25 (51%)	32 (65%)	10 (59%)	67 (58%)
Undergraduates	21 (43%)	14 (29%)	3 (18%)	38 (33%)

prepared for their transition: 69 percent estimate that their GPAs after transferring were 3.00 or higher. Of the students who matriculated to a senior institution, 62 percent have graduated and 32 percent are currently undergraduates (see Table 3). Bearing in mind that the average science majors completed more than 70 units while at Skyline, it has been shown that while grades are the best indicator of success, "more" units earned at a community college correlates with a higher rate of success at a senior institution (Nolan, 1974). While the responders are probably achievers, responses indicate that Skyline science students were able to compete and be successful at senior institutions.

Ninety-six percent were very-satisfied-to-satisfied with their preparation for transfer as a science major. Science and math classes transferred in accordance with our articulation agreements and students did not have to repeat courses. The few students who knowingly took classes they would have to retake as upper division or graduate students felt they needed the extra preparation.

Employment

All responses are shown in Figure 10, 80 percent of all employed respondents say their job is related to their program of study. Seventy-five percent of the respondents who are not currently in school are working in math- or science-related fields. The majority of these respondents got their jobs after graduating from their transfer school and, 12 percent, after having other jobs, internships, or earning advanced degrees. Of the 15 respondents who are working in non-math- or science-related fields: two are in the military, three did not transfer, and four left their transfer school before earning a degree.

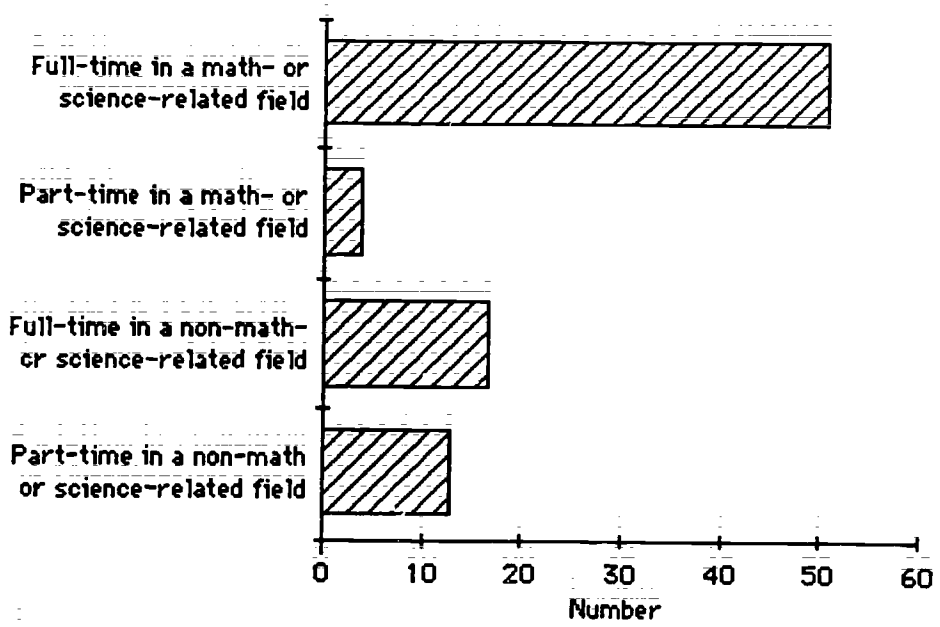

Figure 10. Areas of employment of respondents.

Former Skyline science students who have earned baccalaureate or higher degrees have a wide variety of careers in the sciences. As it is impractical to list individual job titles, we have attempted to catagorize careers into areas (see table 4). This means veterinarians and dentists as well as medical doctors and nurses are identified as health care professionals. Former students with responsibility for research design including protein chemists and geologists are identified as scientific researchers, separate from those developing computer hardware and software. Engineering includes civil, aeronautical, mechanical, nuclear, and electrical. Environmental scientists work in toxic waste management and other hazard controls.

Table 4. Career areas of former Skyline science majors who have graduated from their transfer schools.

Career Area	Percent of respondents
Health care	36
Engineering	17
Scientific research	14
Science education	12
Environmental science	7
Computer research and design	5
Financial mgmt/analysis	5
Laboratory technician	5

Instructors encouraged independent thinking and self-directed studying.

I was very pleased and relieved that all my Skyline courses were transferable to UC Davis. I also felt that the good instruction I had received at Skyline made my transition into courses at UC Davis much easier and helped me to perform better in those classes as a result. The smaller class sizes and close teacher-to-student contact at Skyline definitely facilitates learning. ...Skyline...was an excellent academic facility. I hope that [it] has maintained its excellence over time.

In 1986, it was recommended

> *That the highest priority and primary functions of the California Community Colleges be reaffirmed as the provision of rigorous, high quality lower division instruction*

because students and society benefit from the education obtained from a transfer program (Commission, 1986). Transferable courses with high standards are an asset to our College and our community and they must be maintained. Results of our study show that Skyline's science and math program is meeting the needs of transfer students.

Science students are dedicated to achieving their goals. Respondents made their commitments to science while they were at Skyline College. As freshmen and sophomores, they took majors' science and mathematics courses and continued to study science after transferring. The majority of respondents who have completed their baccalaureate degrees are working in science and science-related fields. The motivation and high achievement-orientation of Skyline College science students is essential to their individual success.

These students feel that the education they received at Skyline College provided a quality stepping-stone for continued education. The students perceived the most important part of this education to be

- quality instruction equal to or better than their transfer institutions
- small class size
- personal attention by the faculty.

Respondents felt instructors were genuinely interested in them and the students benefitted from the efforts instructors made to work with them individually. The small classes at Skyline College provide a means for faculty to work closely with students and promote students' individual success by encouraging each student's particular aptitudes. Additionally, because they work closely with faculty, students feel that professionals believe in them. This environment at Skyline College gives our students the confidence and self-esteem needed to meet life's challenges.

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Appendices

A. Survey with responses. Cover letter

B. Student data file

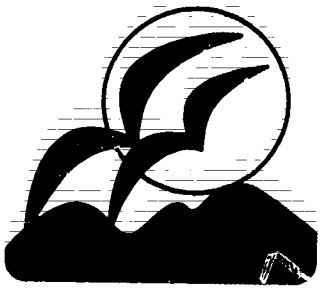
C. Majors' courses

D. Student outcomes

Appendix A

Questionnaire with responses

Cover letter



N = 123

Skyline College • 3300 College Drive • San Bruno, California 94066 • 415-355-7000, ext. 221

All former Skyline students: please complete part I.

Part I

1. Check the item that describes your present major activity.

62 In school. Please specify:
- 38 undergraduate;
- 18 graduate;
- 7 professional school

78 Employed
1 Not employed
2 Full-time home responsibility
3 Other (Please specify_____)

2. Check the reasons that most closely correspond to your reasons for attending Skyline College.

81 Inexpensive
19 Unsure at the time whether I wanted to go to college
83 Convenient location
4 Financial aid was available
12 Unwilling or unable to attend another college
22 Skyline College's good academic reputation
25 Advice of friends/family
3 Advice of high school counselor/teacher
1 Don't know
32 Other (Please specify_____)

3. While attending Skyline College did you also work at a regular job

14 Full-time
84 Part-time
25 Did not have a regular job

4. While attending Skyline College did you take any science or math classes in the evening (6:00-10:00 PM)?

99 Rarely or never
20 Occasionally (about once a semester)
4 Most or all

5. What is your overall evaluation of instruction received at Skyline College **in science and math courses**?

1 Very poor
0 Poor
5 Average
37 Good
80 Very good

6. What is your overall evaluation of instruction received at Skyline College **in all other courses**?

0 Very poor
0 Poor
26 Average
61 Good
29 Very good

7. Would you recommend Skyline College to friends in a situation similar to yours?

117 Yes
4 No

8. What did you feel were the strong points of science and math instruction at Skyline College?

9. What did you feel were the weak points of science and math instruction at Skyline College?

10. What do you know today that would have been helpful to have known when you were at Skyline College.

If you transferred to another school after leaving Skyline College, please complete part II; otherwise, go to part III. N = 116

Part II

11. To what type of school did you transfer?
    - 2 Another community college (Name_____)
    - 49 A California State College/University (Name_____)
    - 49 The University of California (Campus_____)
    - 13 Other (Please specify_____)

12. Please provide the following information.

A. If currently a student, what is your major? Your school?

_____ _____

B. If you have graduated:

Institution	Degree earned	Major	Year

C. If you are not currently in school and have not earned a degree: what year have you completed?

2 Sophomore
5 Junior
3 Senior

Major: _____

13. Below we have listed some important features of college life. We would like you to rate **Skyline College's Science & Math Departments** on each of them. Then we would like you to rate your **transfer school**. Write the number corresponding to your response on the appropriate line.

1-Low; **2**-Fairly low; **3**-Average; **4**-Above average; **5**-High

	Skyline College	Transfer school
Accessibility of faculty		
Professionalism of faculty		
Academic advising		
Help with personal problems		
Quality of instruction		
Quantity of instruction		
Competition for grades		
Amount of homework		
Help with vocational planning		
Making friends		
Overall rating of school		

14. Name any Skyline science/math courses that did not transfer. Please give us the reason why this school did not credit a course. Please do not list any courses that you failed.

15. Please estimate your overall grade point average for courses taken **after** leaving Skyline College.

30 3.5 or over
47 3.0 to 3.4
28 2.5 to 2.9
3 2.0 to 2.4
3 Less than 2.0

16. How satisfied were you with your preparation for transfer as a science or math major?

62 Very satisfied
45 Satisfied
4 Not satisfied. If "not satisfied", briefly indicate why not.

17. Please rate your transition to your transfer school: (Circle one)

Difficult 1	2	3	4	5 Easy
5	16	23	29	38

18. Did you repeat at your transfer school any classes taken at Skyline?

20 Yes
91 No
If "yes", would you briefly compare the classes.

If you are employed, please complete part III; otherwise, go to part IV.

Part III

19. Are you employed

51 Full-time in a math- or science-related field
14 Part-time in a math- or science-related field
17 Full-time in a non math- or science-related field
13 Part-time in a non math- or science-related field

20. Current title and duties_____

_____

_____

21. Relationship between your program of study and your job.

38 Program directly related
34 Program somewhat related
18 Program unrelated

22. When did you get this job?

8 While at Skyline College
14 After leaving Skyline College
43 After graduating from your transfer school
28 Other (Specify_____)

If you are not employed, please complete part IV.

Part IV

23. Please check one:
    14 I am seeking a job
    I am not seeking a job

24. If you are seeking a job, please check the major reason you have been unable to secure employment.
    0 Salary too low in the field for which I prepared. (Field:_____)
    1 There are few openings in the field for which I prepared. (Field:_____)
    9 I need more education to qualify for the job I want. (Job:_____)
    3 I have changed my career objective (to _____) since graduating.
    2 I have not looked hard enough.
    3 Other (Specify_____)

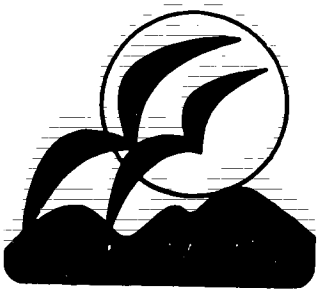
Please write any additional comments below.

If the name/address used to mail this are incorrect, please provide your current name/address so that we can contact you for math-science events.

_____
_____
_____

Thank you for completing this questionnaire. Please return it in the prepaid envelope.

ID # for tabulating responses.
Your responses will be kept confidential.



SKYLINE COLLEGE □ 3300 COLLEGE DRIVE □ SAN BRUNO, CALIFORNIA 94066 □ PHONE 415 355-7000

March 18, 1987

Dear Math/Science Student,

As a former Math/Science student at Skyline College, you are our most valuable source of information on how we can improve our program so we can better assist students in transferring to four-year schools and beginning employment.

Your assistance in determining how successful our program is in meeting these goals will be greatly appreciated. Would you take a few minutes to complete the enclosed questionnaire and return it to us in the prepaid envelope by April 8th?

Please be assured that all information you supply will be held in confidence and that your name will never be associated with any responses.

We really appreciate your cooperation in this important effort.

Thanks very much.

Sincerely yours,

Dr. Christine L. Case
Instructor, Biology

Dr. George W. Goth
Instructor, Chemistry

Student Record

Last name

First and middle name

Street/apt

City

State Zip

SSN

Birthyear:

Sex:

Age entering Skyline:

Dates at Skyline:

From: Sem Yr

To: Sem Yr

No. of years at Skyline:

GPA:

Units:

Courses:

Biology
Chemistry
Math
Physics
Geology

Notes

Response received:

Yes No

Student Response

ID code

Question 1
Question 2
Question 3
Question 4
Question 5
Question 6
Question 7
Question 11 School:
Question 12 (Identify all degrees)
Major:
Question 12C

Question 13 Skyline Transfer

- Accessibility
- Professionalism
- Advising
- Personal
- Quality
- Quantity
- Competition
- Homework
- Vocational
- Friends
- Overall

Question 15
Question 16
Question 17
Question 18
Question 19
Question 20

Question 21
Question 22
Question 23
Question 24

Appendix C

Course Names and Numbers

Current number	Subsumes	From	To	Name
Biology 215		F 1982	Present	Organismal Biology
	Biol. 210	F 1979	Sp 1982	
	Biol. 220	F 1979	Sp 1982	
	Biol. 21	F 1973	Sp 1979	
	Biol. 22	F 1973	Sp 1979	
	Zool. 1a	F 1969	Sp 1973	
	Zool. 1b	F 1969	Sp 1973	
	Bot. 1	F 1969	Sp 1973	
Biology 230		F 1979	Present	Introduction to Cell
	Biol. 20	F 1973	Sp 1979	Biology
Biology 240		F 1979	Present	General Microbiology
	Biol. 23	F 1963	Sp 1979	
	Bact. 1	F 1969	Sp 1973	
Biology 250		F 1979	Present	Human Anatomy
	Biol. 24	F 1973	Sp 1979	
	Anat. 1	F 1969	Sp 1973	
Biology 260		F 1979	Present	Introduction to
	Biol. 25	F 1973	Sp 1979	Physiology
	Physiol. 1	F 1969	Sp 1973	
Chemistry 210		F 1979	Present	General Chemistry I
	Chem. 1a	F 1969	Sp 1979	
Chemistry 220		F 1979	Present	General Chemistry II
	Chem. 1b	F 1969	Sp 1979	
Chemistry 234		F 1979	Present	Organic Chemistry I
	Chem. 12a	F 1969	Sp 1979	
Chemistry 235		F 1979	Present	Organic Chemistry II
	Chem. 12b	F 1969	Sp 1979	
Chemistry 250		F 1979	Present	Quantitative Analysis
	Chem. 5	F 1969	Sp 1979	

Course Names and Numbers

Current number	Subsumes	From	To	Name
Geology 210		F 1979	Present	General Geology
	Geol. 1a	F 1969	Sp 1979	
Mathematics 241		F 1979	Present	Applied Analytic
	Math 23a	F 1973	Sp 1979	Geometry & Calculus I
Mathematics 242		F 1979	Present	Applied Analytic
	Math 23b	F 1973	Sp 1979	Geometry & Calculus II
Mathematics 251		F 1979	Present	Calculus with Analytic
	Math 30	F 1969	Sp 1979	Geometry I
Mathematics 252		F 1979	Present	Calculus with Analytic
	Math 31	F 1969	Sp 1979	Geometry II
Mathematics 253		F 1979	Present	Calculus with Analytic
	Math 32	F 1969	Sp 1979	Geometry III
Physics 210		F 1979	Present	General Physics I
	Phys. 2a	F 1969	Sp 1979	
Physics 220		F 1979	Present	General Physics II
	Phys. 2b	F 1969	Sp 1979	
Physics 250		F 1979	Present	Physics with
	Phys. 4a	F 1969	Sp 1979	Calculus I
Physics 260		F 1979	Present	Physics with
	Phys. 4b	F 1969	Sp 1979	Calculus II
Physics 270		F 1979	Present	Physics with
	Phys. 4c	F 1969	Sp 1979	Calculus III

Appendix D

Student Outcomes

	CSUC	UC	Other
Number	49	49	17
Ave. Skyline GPA	3.1	3.3	3.0
No. reporting GPA >3.0 at transfer school	32	33	9
Number Graduated	25 (51%)	32 (65%)	10 (59%)
Undergraduates	21 (43%)	14 (29%)	3 (18%)
Number pursuing (earned) higher degrees	14	12	6

Schools (N)

SFSU (34)	Davis (20)	USF(3)
SJSU (7)	Berkeley (17)	Santa Clara U.(3)
SLO (2)	Santa Cruz (4)	Utah St. U. (1)
Pomona (1)	SF (4)	Idaho St. U. (1)
Stanislaus (1)	Irvine (3)	Tufts (2)
Chico (2)	Santa Barbara (1)	W. Wash. U. (1)
Fresno (2)		Life. Chirop. (1)
		St. Mary's (1)
		USC (1)
		U. Philippines (1)
		CSM (2)*

* One student transferred to CSM for mechanical engineering requirements before going to CSUC, SLO. Another, transferred to complete a three-semester math sequence before going to UC, Davis.